BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

IN RE APPLICATION NO. 99-1	)	
	)	EXHIBIT _____(NK-T)
	)	
SUMAS ENERGY 2	)	
GENERATION FACILITY	)	
_____	)	

CONSTANCE HOAG'S
PREFILED DIRECT TESTIMONY

WITNESS # 3: DR. NATHAN KRONENBERG

Q. **Please introduce yourself to the Council**.

A. My name is Nathan Kronenberg.

Q. **What is the subject of your testimony?**

A. My direct testimony is intended to address the following subjects: noise and its physiologic and psychologic effects.

Background & Experience

Q. Please describe your background.

A. I have a Bachelors Degree in Science, a Doctor of Medicine degree, and a specialty degree in Psychiatry. I am a licensed Physician in the state of Washington and a life member of the American Psychiatric Association. I have sixteen years of experience in general medicine and twenty-six years of experience in the field of psychiatry. Please see attached Exhibit ____(NK-1)

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Q. Do you have knowledge and background in the physiologic and psychologic impacts of noise?

A. Yes, both from personal experience and literature research.

Testimony

Q. The Sumas noise ordinance states that "…excessive noise is a form of pollution which has direct and harmful effects upon the health and welfare of persons exposed to such sound, lowers the value of impacted properties and generally adversely affects the livability, peace and comfort of the impacted neighborhoods and the City as a whole; and Whereas, it is the declared policy of the City to minimize the exposure of citizens to the psychological and physiological dangers of excessive noise and to protect, promote and preserve the public health, safety and welfare. It is the express intent of the City Council to control the level of noise in a manner which promotes commerce; the use, value and enjoyment of property; sleep and repose; and the quality of the environment." What harmful effects, or physiological and psychological dangers could be anticipated?

A. I will first list the physiologic impacts of noise and later go into details and supportive scientific literature.

#1: Hearing impairment

#2: Sleep disorders, both acute and chronic

#3: Cardiovascular effects

#4: Gastrointestinal effects

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#5: General health effect

#6: Fetal responses in pregnancy

and now the phsychologic dangers:

#1: Personality changes with irritability and aggressive behaviors

#2: Impaired concentration and depression - even suicide

#3: Social conflicts and anti-social behavior

#4: Increased use of tranquilizers and sleeping pills

#5: Disruption of learning in children

#6: Annoyance as a stressor leading to psychosocial effects

Q. As a physician, do you review current medical literature to keep abreast of research?

A. As a requirement for continued licensure in the state of Washington, I am required to participate in continued medical education yearly and to review the current medical and psychiatric literature on an ongoing basis.

Q. Are there available studies that you can cite that would to reference the impacts of noise on human health and mental states?

A. Yes. I am able to provide an extensive literature and bibliography addressing the physiologic and psychologic impacts of noise.

The Noise Pollution Clearinghouse, a national non-profit organization cites the following current list of general references, including, but not limited to:

(1) Noise and its Effects (Suter, 1991)

(2) Noise: A health problem (EPA, 1978)

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(3) Noise Effects Handbook: A desk reference to health and welfare effects of noise (EPA, 1981)

(4) Community Noise (WHO, 1995)

In addition, I am able to provide specific and more current U.S. and foreign literature with reference to health effects.

Q. What are the impacts of long-term exposure to continuous noise levels, even at lower decibel levels?

A. Recent studies have demonstrated psychosocial effects of noise annoyance due to environmental noise such as road, railway, and aircraft even in lower decibel ranges in populations chronically exposed (aircraft noise rates as most annoying of the three.) Specific disturbances in sleep pattern and sleep stages, including nighttime awakening due to noise have been measured as low as 35-40 decibels. (Environmental health perspectives: Noise exposure and public health 3/2000) See Exhibit _____(NK-2)

Q. What are the specific psychologic effects of sleep disturbances due to noise?

A. Mood changes and cognitive impairment are the two general responses noted and documented by studies. Anger, frustration and even depression have been associated with noise exposure, including aggravation of existing emotional disorders. Cognitive impairment is manifest as poor concentration and focus.

Q. What other psychosocial effects have been studied?

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A. Chronic exposure to environmental noise has been studied in epidemiologic investigations of annoyance, well being, and psychiatric hospitalization. The main effect observed in these studies is annoyance. Noise annoyance is manifest by feeling of resentment, displeasure, discomfort, dissatisfaction or offence when noise interferes with one's thoughts, feelings, or actual activities.

Q. "Noise" is defined in the Sumas ordinance as "the intensity, duration, and character of sounds from any and all sources." Could you explain the significance of intensity, duration, and character of sounds, in their effect on humans?

A. The measurement of pitch in Hertz, the physical quantity sound pressure level expressed in decibel, and of course the duration of the sound all provide a basis for predicting the effects on the human organism. Increasing levels of any of these carry with it the increasing risk of adverse impacts, even given the absence of one or the other.

Q. What is vibroacoustic disease (VAD), its origins and relationship to LPALF noise and its effects on the human body?

A. VAD is an extra-aural noise induced pathology, induced by long term exposure to large pressure amplitude and low frequency noise (LPALF). Its human consequences, generated by noise induced vibration, are primarily to the cardiorespiratory apparatus. Symptoms are chest pain, mood swings, back pain, fatigue and other less frequent complaints. There are a number of diagnostic medical tests available to measure the changes to the body, specifically the cardiac and respiratory system. Noise induced vibration is airborne until impact

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with human tissue. Conclusions of a recent study suggest that noise should cease to be simply characterized only in terms of decibels and that all noise assessments should be accompanied by a frequency spectrum analysis. (Aviation, Space, and Environmental Medicine: March 1999). See Exhibit ____(NK-3)

Q. Do you have any other comments regarding noise that you would like to address to the Council?

A. Yes, in conclusion I quote Dr. William H. Stewart, former U.S. Surgeon General: "calling noise a nuisance is like calling smog an inconvenience. Noise must be considered a hazard to the health of people everywhere."

END OF TESTIMONY

I declare under penalty of perjury that the foregoing testimony is true and correct to the best of my knowledge.

DATED: June ____, 2000

By _____
Nathan Kronenberg

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